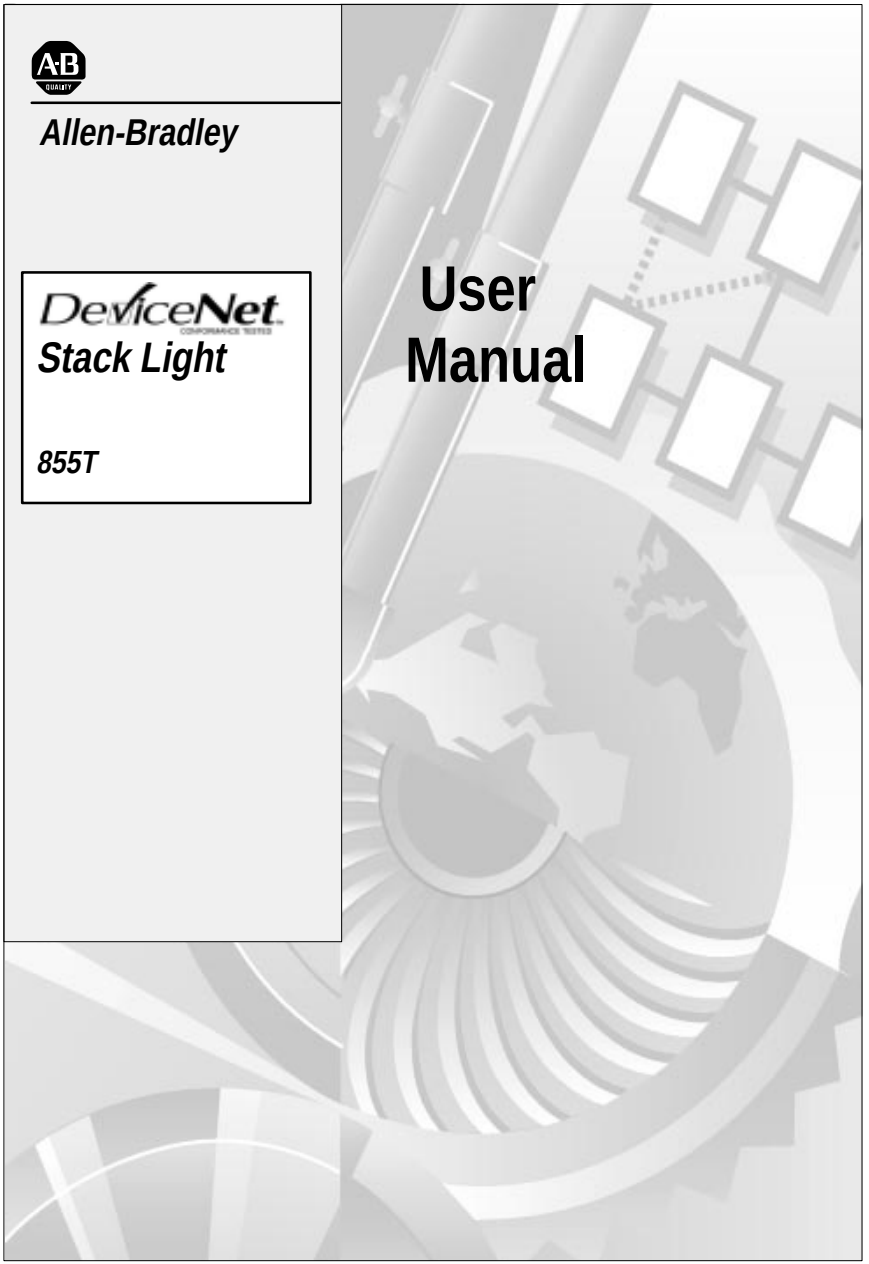

Allen-Bradley

DeviceNet

Stack Light

855T

User Manual

Important User Information

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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Throughout this manual we use notes to make you aware of safety considerations:

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is critical for successful application and understanding of the product.

DeviceNet is a trademark of the Open DeviceNet Vendor Association (ODVA).

Table of Contents

Important User Information . . . . . Inside Cover

Preface

Intended Audience P–1
Contents of Manual P–2
Related Publications P–2
EDS Web Site P–2

Chapter 1 Overview of DeviceNet™ Stack Light

Chapter Objectives 1–1
Description 1–1
Summary of Features 1–2
Base Features 1–2
Module Positions 1–3
Rotary Switches 1–3
DeviceNet™ Connection 1–4
DeviceNet™ Sealed Connector 1–4
DeviceNet™ Open Style Connector 1–4
Typical DeviceNet™ Configuration 1–4
DeviceNet™ Components 1–5
Replacement Parts 1–6

Chapter 2 Quick Start

Chapter Objectives 2–1
Data Rate Configuration 2–1
Node Address Configuration 2–2
Installing the Modules 2–2
Connection to the Network 2–3
Stack Light Parameter Configuration 2–3
Scanner Configuration 2–4

Chapter 3 Installation and Mounting

Chapter Objectives 3–1
DeviceNet™ Guidelines 3–1
Equipment Needed 3–1
Setting the Rotary Switches 3–2
Setting the Data Rate 3–3
Setting the DeviceNet™ Node Address 3–4
DeviceNet™ Stack Light Base Dimensions 3–5
Mounting the DeviceNet™ Stack Light 3–6

Chapter 4 Operations

Chapter Objectives 4–1
Modes of Operation 4–1
Power-up/Reset Mode 4–2
Run Mode 4–3
Control / Status Communications 4–6
Error Mode 4–7
Resetting the Device 4–7
DeviceNet™ Operations 4–8

Chapter 5 Troubleshooting and Maintenance

Chapter Objectives 5–1
Preventive Maintenance 5–1
LED Indicators 5–2
Troubleshooting 5–3
Bulb Burnout 5–4

Appendix A Specifications

Mechanical Ratings A–1
Materials of Construction A–1
Shock and Vibration A–2
Environmental Ratings A–2
Ingress Ratings A–2
Temperature Ratings A–3
Relative Humidity (Non-Condensing) A–3
Electrical Ratings A–3
Supply Voltage A–3
Power Consumption A–3
Outputs (Modules) A–3
DeviceNet™ Connection Cables A–3
Flash Upgrade Frequency A–4
Communications A–4
Data Rates A–4
Distances A–4
Certifications A–4
Special Notes A–4

Appendix B DeviceNet™ Information

General Information B–1
Message Types B–1
Class Services B–2
Object Classes B–2
Class Code 001 (0x01): Identity Object B–3
Class Code 002 (0x02): Message Router Object B–5
Class Code 003 (0x03): DeviceNet™ Object B–5
Class Code 004 (0x04): Assembly Object B–7
Class Code 005 (0x05): Connection Object B–9
Class Code 008 (0x08): Discrete Input Point Object B–11
Class Code 009 (0x09): Discrete Output Point Object B–12
Class Code 015 (0x0F): Parameter Object B–13
Class Code 029 (0x1D): Discrete Input Group Object B–15
Class Code 030 (0x1E): Discrete Output Group Object B–16
Class Code 043 (0x2B): Acknowledge Handler Object B–17
Class Code 161 (0xA1): Non-Volatile Storage Object B–18

Preface

This manual gives an overview of the Bulletin 855T DeviceNet™ Stack Light and describes how to configure, install, operate and troubleshoot the device on the DeviceNet™ Network.

Intended Audience

This manual is for the individuals responsible for installing, mounting and operating the 855T DeviceNet™ Stack Light in an industrial environment.

You should understand DeviceNet™ Network operations, including how slave devices operate on the network and communicate with a DeviceNet™ Master.

Contents of Manual

This manual is organized as follows:

Chapter	Title	Description
	Preface	Describes the purpose and contents of the manual, and the intended audience.
1	Overview	Provides an overview of the 855T DeviceNet™ Stack Light and its features.
2	Quick Start	Describes how to get the DeviceNet™ Stack Light operating on the network.
3	Installation and Mounting	Describes how to configure, mount and install the 855T DeviceNet™ Stack Light device on the DeviceNet™ Network.
4	Operations	Describes 855T DeviceNet™ Stack Light operations and other pertinent information.
5	Troubleshooting and Maintenance	Provides information on how to troubleshoot and maintain the device.
A	Specifications	Provides 855T DeviceNet™ Stack Light specifications.
B	DeviceNet™ Information	Describes DeviceNet™ message types, class services and object classes supported by the 855T DeviceNet™ Stack Light.

Related Publications

The following table lists DeviceNet™ Network related publications.

Publication Title	Publication No.
DeviceNet™ Cable System Planning and Installation Manual	DN-6.7.2
1771-SDN Scanner Module Installation Instructions	1771-2.29

EDS Web Site

EDS files are available for downloading at:
http*://supportbbs.ra.rockwell.com*
Login using the following information:

User Name: **supportguest**
Password: **abhelp**

Chapter 1

Overview of DeviceNet™ Stack Light

Chapter Objectives

This chapter provides an overview of the DeviceNet™ Stack Light and its features. It contains the following sections:

Section	Page
Description	1–1
Base Features	1–2
Module Positions	1–3
Rotary Switches	1–3
DeviceNet™ Connection	1–4
Typical DeviceNet™ Configuration	1–4
DeviceNet™ Components	1–5
Replacement Parts	1–6

Description

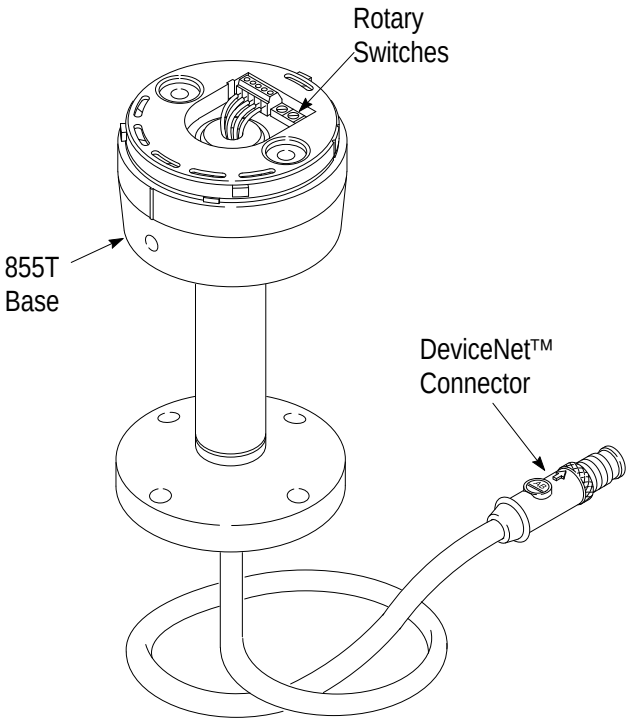
The 855T Control Tower™ Stack Light line offers DeviceNet™ Bases for applications where network communication is desired. All of the functionality for the DeviceNet™ Interface is contained within the mounting base. All light and sound modules for the 855T Control Tower™ Stack Light line are compatible with the standard bases, or with DeviceNet™ Bases. The entire stack is powered from the DeviceNet™ Network. A separate power supply is not required.

The 855T Control Tower™ Stack Light DeviceNet™ Bases allow up to 5 light modules, 4 light modules plus a combination light and sound module, 4 light modules plus a single-tone sound module, or 3 light modules plus a dual-tone sound module.

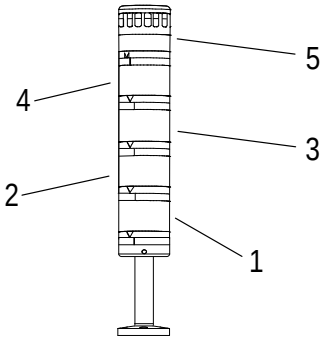
Summary of Features

- Standard or assembled configurations
- Surface mounting, pole mounting (10 cm or 25 cm), vertical mounting, and conduit mounting available
- Allows the use of up to 5 modules in 1 stack
- NEMA Type 12 environmental rating
- Easy installation and startup
- DeviceNet™ connectivity
- Powered by DeviceNet™ connection (no power supply required)
- Available with stranded wire or micro connector
- DeviceNet™ Cable is pre–wired to all bases

Base Features



Module Positions

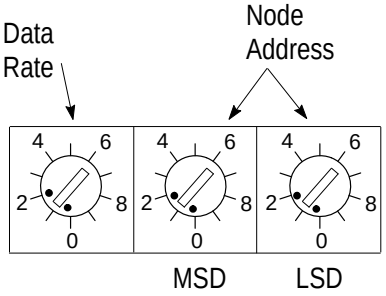


Rotary Switches

The DeviceNet™ Stack Light has three 10-position rotary switches for setting:

- DeviceNet™ Data Rate
- DeviceNet™ Node Address

The rotary switches are located on the circuit board on the top of the base. The switch settings and functions are shown below.

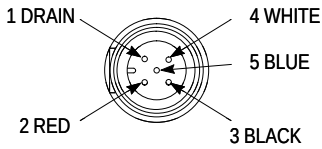


DeviceNet™ Connection

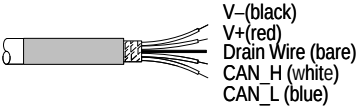
The DeviceNet™ Stack Light receives all power and communications through the DeviceNet™ Cable. A separate power supply is not required. This is the only external connection to the DeviceNet™ Stack Light.

The DeviceNet™ Stack Light connects to the DeviceNet™ Network using a cable with a sealed connector or an open style connector.

DeviceNet™ Sealed Connector

Sealed Connector	Pin #	Signal	Function	Color
	1	SHIELD	SHIELD	Uninsulated
	2	VDC+	Power Supply	Red
	3	COM	Common	Black
	4	CAN_H	Signal High	White
	5	CAN_L	Signal Low	Blue

DeviceNet™ Open Style Connector

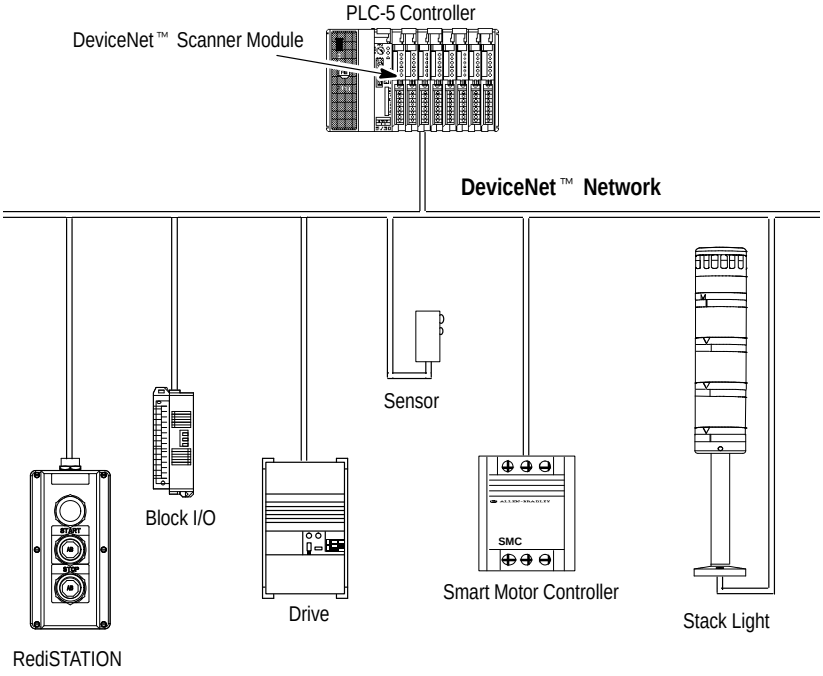
Open Style Connector	Signal	Function	Color
	COM	Common	Black
	CAN_L	Signal Low	Blue
	SHIELD	Shield	Uninsulated
	CAN_H	Signal High	White
	VDC+	Power Supply	Red

Typical DeviceNet™ Configuration

A DeviceNet™ Network supports multiple Stack Light devices and allows them to communicate with other network devices (up to 64).

The DeviceNet™ Stack Light operates on the network as a slave device. It does not initiate communications except for a duplicate node address check on power-up. The master writes data to, and receives data back from, the DeviceNet™ Stack Light.

The following DeviceNet™ configuration shows a variety of products operating as slaves to a PLC-5 controller with a 1771-SDN DeviceNet™ Scanner Module.



DeviceNet™ Components

DeviceNet™ Cables and components are available from Allen-Bradley as separate catalog numbers.

It is your responsibility to install and implement the DeviceNet™ Network and supported devices according to the DeviceNet™ guidelines.

Replacement Parts

The DeviceNet™ Stack Light Bases and pre–assembled stacks come with all the parts required to install and use the product. The installer needs only to supply the mounting hardware.

Replacement parts for 855T components (modules, replacement gaskets, and replacement lamps) are available as separate catalog numbers. Refer to the Control Tower™ Stack Lights Selection Guide (Publication 855T–1.0) or the Industrial Controls Catalog.

Quick Start

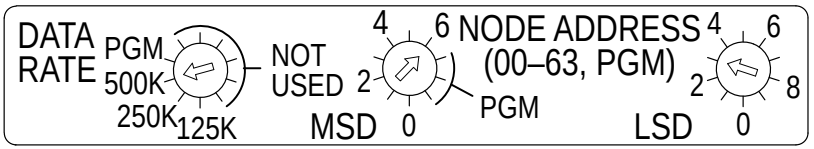
Chapter Objectives

This chapter provides the necessary steps to get the DeviceNet™ Stack Light operating on the network. It contains the following sections:

Section	Page
Data Rate Configuration	2–1
Node Address Configuration	2–2
Installing the Modules	2–2
Connection to the Network	2–3
Stack Light Parameter Configuration	2–3
Scanner Configuration	2–4

Data Rate Configuration

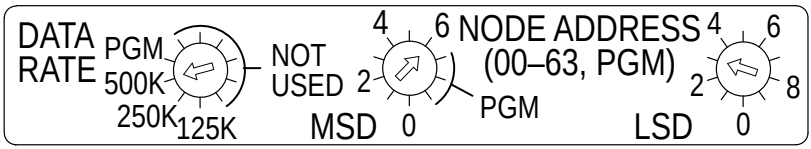
Rotary switch 3 (S3) sets the data rate at which the DeviceNet™ Stack Light communicates on the DeviceNet™ Network. The factory default setting is 125KB.



For more information on data rate configuration, please see Chapter 3 – Installation and Mounting (Setting the Data Rate).

Node Address Configuration

Rotary switches 1 (S1) and 2 (S2) set the node address (0 to 63) of the Stack Light on the DeviceNet™ Network. The factory default is 63.



For more information on node address configuration, please see Chapter 3 – Installation and Mounting (Setting the DeviceNet™ node address).

Installing the Modules

The Stack Light Modules are installed to the base by placing a sealing o–ring between the base and the module, lining up the arrow on the bottom of the module with the line on the top of the prior module or base, and twisting the top module clockwise to lock them into place.

Important: The DeviceNet™ Base is compatible with all 24V DC 855T modules.

For more information on different modules, please refer to the Control Tower™ Stack Lights Selection Guide (Publication 855T–1.0) or the Industrial Controls Catalog.

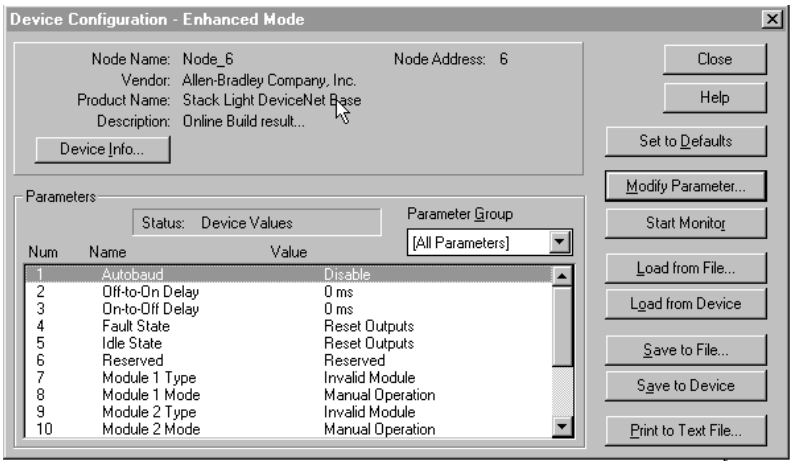
Connection to the Network

Wire the DeviceNet™ Stack Light to an operating network. If the device is an 855T–DSxxxx, the wires should be connected to a terminal block. If the device is an 855T–DMxxxx, it will be connected with the micro connector. The device is fully powered by the network, therefore it is important that the device is located near a power supply.

For more information on system installation, please refer to the DeviceNet™ Cable System – Planning and Installation Manual (Publication DN-6.7.2).

Stack Light Parameter Configuration

In order for proper operation, the parameters of the Stack Light must be configured. There are several different parameters that can be configured, but the critical parameters are Module Type and Module Mode. The parameters can be configured using the DeviceNet™ Manager Software. The graphic below shows the Stack Light Configuration screen from the DeviceNet™ Manager Software.

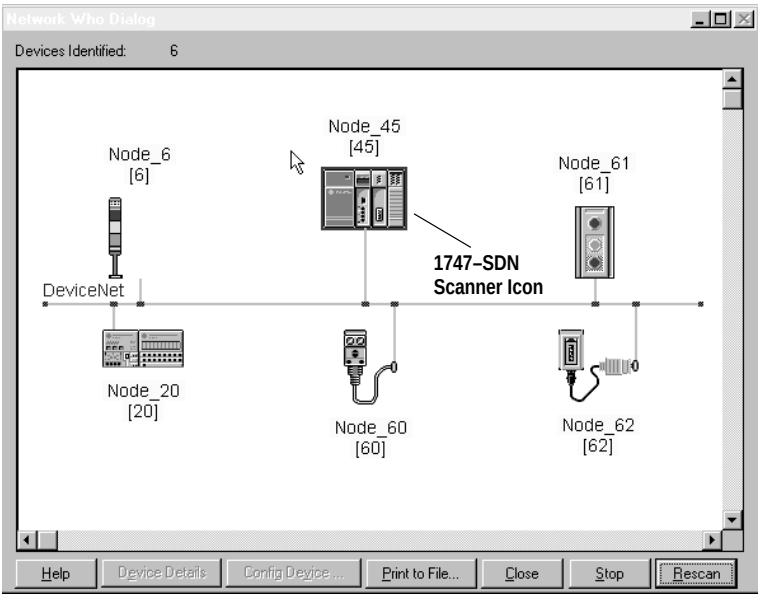


For more information on device configuration, please see Chapter 4 – Operations (Modes of Operation), and DeviceNet™ Manager Software User Manual (Publication 1787-6.5.3).

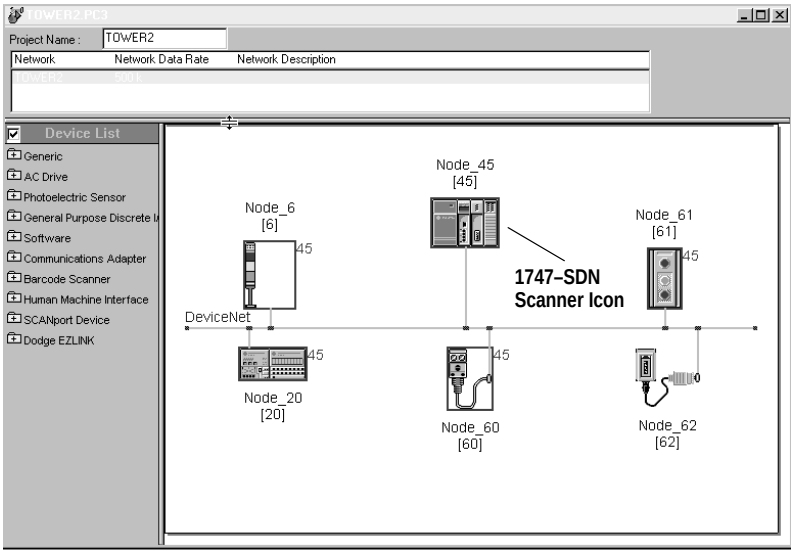
Scanner Configuration

In order for proper operation, the scanner must be configured. The following graphics show the configuration of a 1747–SDN from the DeviceNet™ Manager Software.

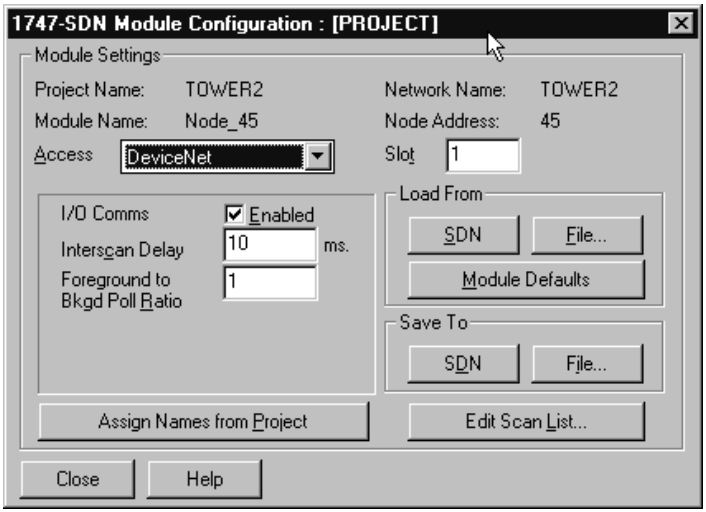
To access the **Module Configuration** screen from a **Network Who**, double click on the **1747–SDN Scanner Icon**.



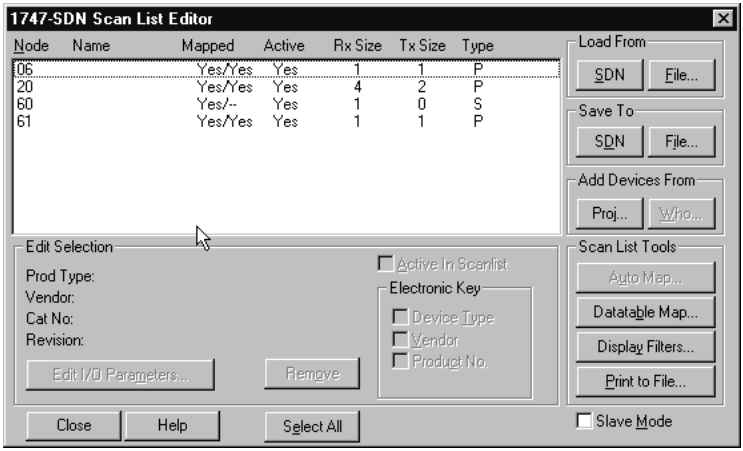
To access the **Module Configuration** screen from a **Project View**, double click on the **1747–SDN Scanner Icon**.



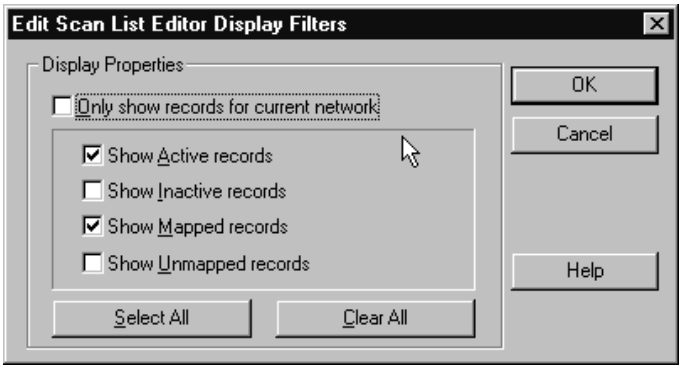
To access the **Scan List Editor**, click on **Edit Scan List**.



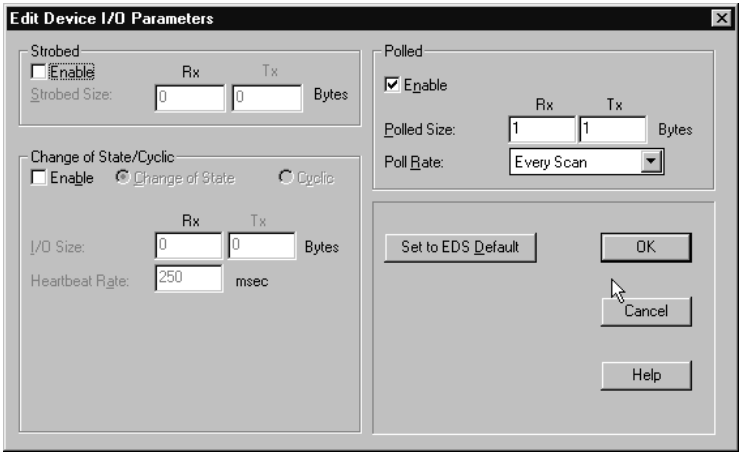
From the **Scan List Editor** you can edit the Scan List Editor display properties, edit the I/O Parameters, view/edit your scan list's data table map, or automatically map your device data.



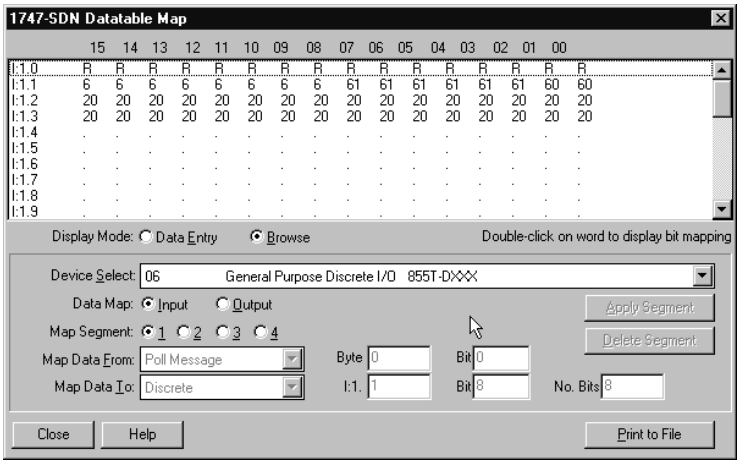
To edit the **Scan List Editor** display properties, click on **Display Filters** on the **Scan List Editor** screen.



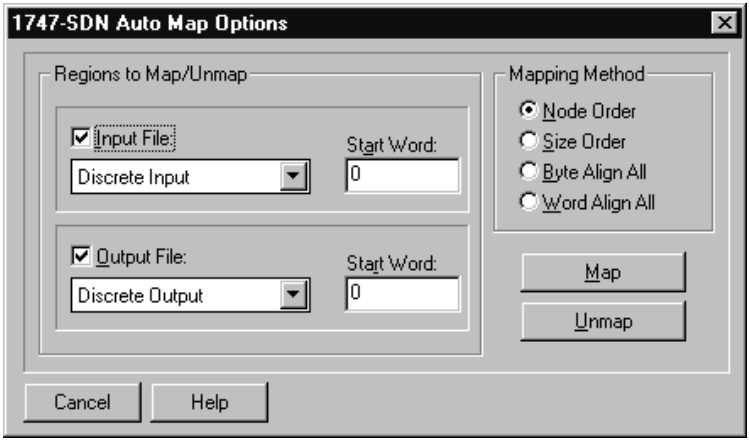
To edit the devices' I/O parameters, click on **Edit I/O Parameters** on the **Scan List Editor** screen. Only Polled I/O is supported by this design.



To view/edit your scan list's data table map, click on **Data Table Map** on the **Scan List Editor** screen.


1747-SDN Datatable Map
15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00
I:1.0 R R R R R R R R R R R R R R R R
I:1.1 6 6 6 6 6 6 6 6 61 61 61 61 61 61 60 60
I:1.2 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
I:1.3 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
I:1.4
I:1.5
I:1.6
I:1.7
I:1.8
I:1.9
Display Mode: Data Entry Browse
Double-click on word to display bit mapping
Device Select: 06 General Purpose Discrete I/O 855T-DXXX
Data Map: Input Output
Map Segment: 1 2 3 4
Map Data From: Poll Message
Map Data To: Discrete
Byte 0
Bit 0
I:1. 1
Bit 8
No. Bits 8
Apply Segment
Delete Segment
Close
Help
Print to File

To have DeviceNet™ Manager software automatically map your device data, click on **Auto Map** on the **Scan List Editor** screen.



For more information on scanner configuration, please refer to the DeviceNet™ Scanner Configuration Manual (Publication 1747-6.5.2 or Publication 1771-6.5.118 depending on your scanner type).

Chapter 3

Installation and Mounting

Chapter Objectives

This chapter describes how to install and mount a standard or custom DeviceNet™ Stack Light. It contains the following sections:

Section	Page
DeviceNet™ Guidelines	3–1
Equipment Needed	3–1
Setting the Rotary Switches	3–2
DeviceNet™ Stack Light Base Dimensions	3–5
Mounting the DeviceNet™ Stack Light	3–6

DeviceNet™ Guidelines

It is your responsibility to install and implement the DeviceNet™ Network and supported devices according to the DeviceNet™ guidelines.

Equipment Needed

Install the DeviceNet™ Stack Light using standard electricians tools.

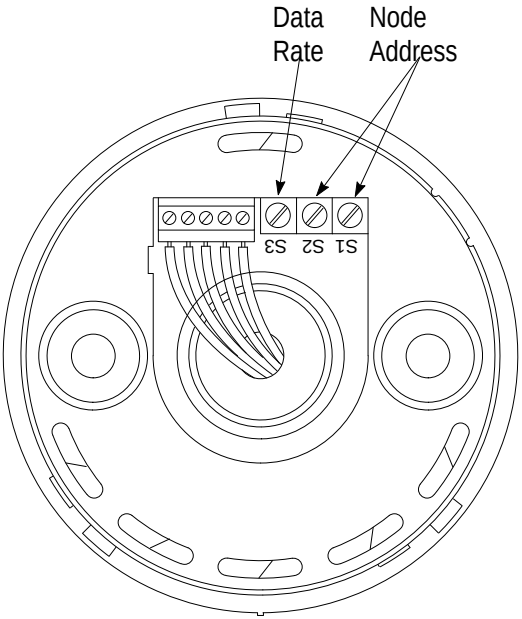
- Slotted screwdriver of standard and small sizes (one small screwdriver, required for setting rotary switches, is included with the product).

Setting the Rotary Switches

The settings of the rotary switches on the circuit board determine:

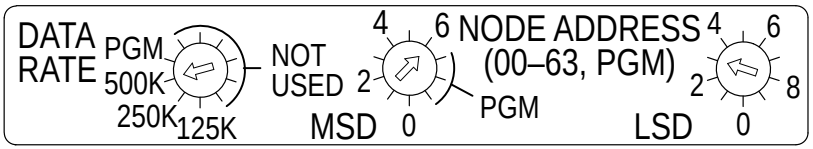
- DeviceNet™ Data Rate
- DeviceNet™ Node Address

The location of the rotary switches is shown below.



Setting the Data Rate

Rotary switch 3 (S3) sets the data rate at which the DeviceNet™ Stack Light communicates on the DeviceNet™ Network. The factory default setting is 125KB.



The data rate determines the maximum length of the DeviceNet™ Cable.

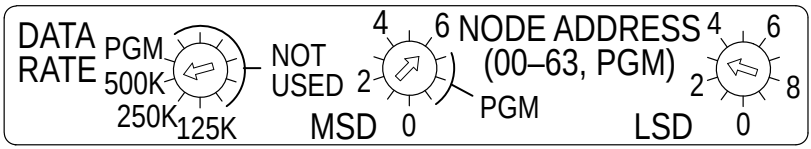
Position	Data Rate	Cable Length (Maximum)
0	125KB	500 meters (1600 feet)
1	250KB	200 meters (600 feet)
2	500KB	100 meters (300 feet)
3	Autobaud	See above, based on data rate of connected network

TO SET THE DeviceNet™ DATA RATE:

1. Refer to the table above to select the correct data rate.
2. If automatic baud rate selection is desired, set switch 3 (S3) in position 3. This disables the switch and allows the device to sync to an operational network. (If Autobaud is disabled through parameter setup, this position is not valid.)

Setting the DeviceNet™ Node Address

Rotary switches 1 (S1) and 2 (S2) set the node address (0 to 63) of the Stack Light on the DeviceNet™ Network. The factory default is 63.



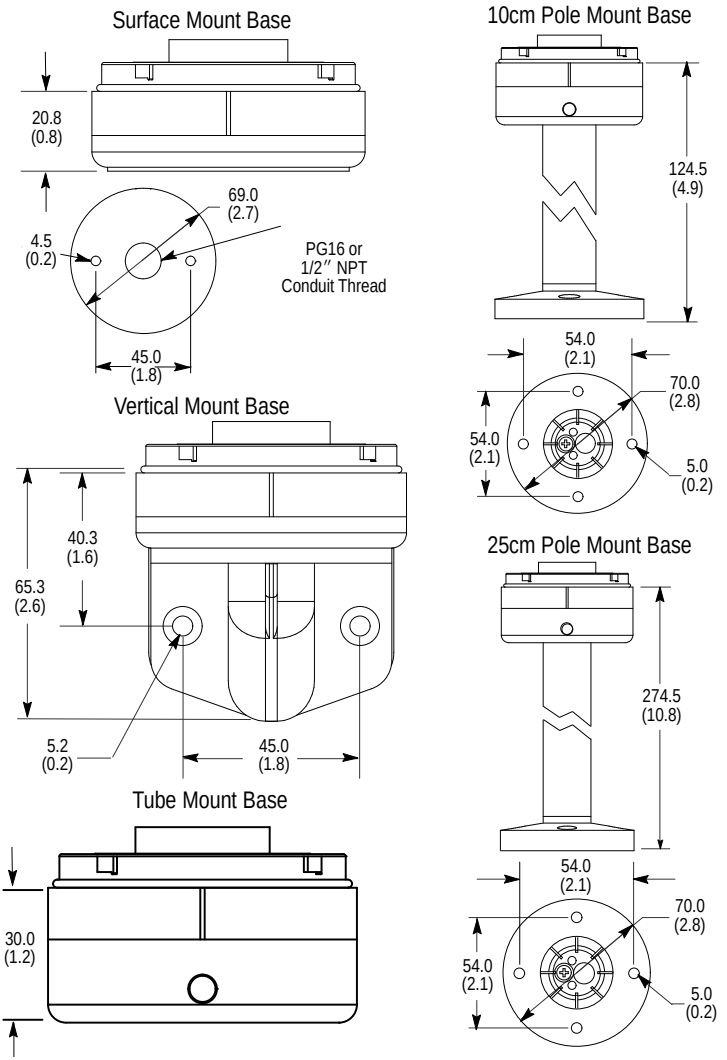
TO SET THE DeviceNet™ NODE ADDRESS:

1. Set Most Significant Digit (MSD) Switch, switch 2 (S2), to tens position. For example, if the desired node address is 27, set switch 2 (S2) to 2.
2. Set Least Significant Digit (LSD) Switch, switch 1 (S1), to ones position. For example, if the desired node address is 27, set switch 1 (S1) to 7.
3. If software programmability is desired, set the node address to 64 or greater. This disables both switches and allows programming through the network. Software will default to 63.

DeviceNet™ Stack Light Base Dimensions

Figure 3.1 shows the dimensions of the Stack Light Bases. Dimensions in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

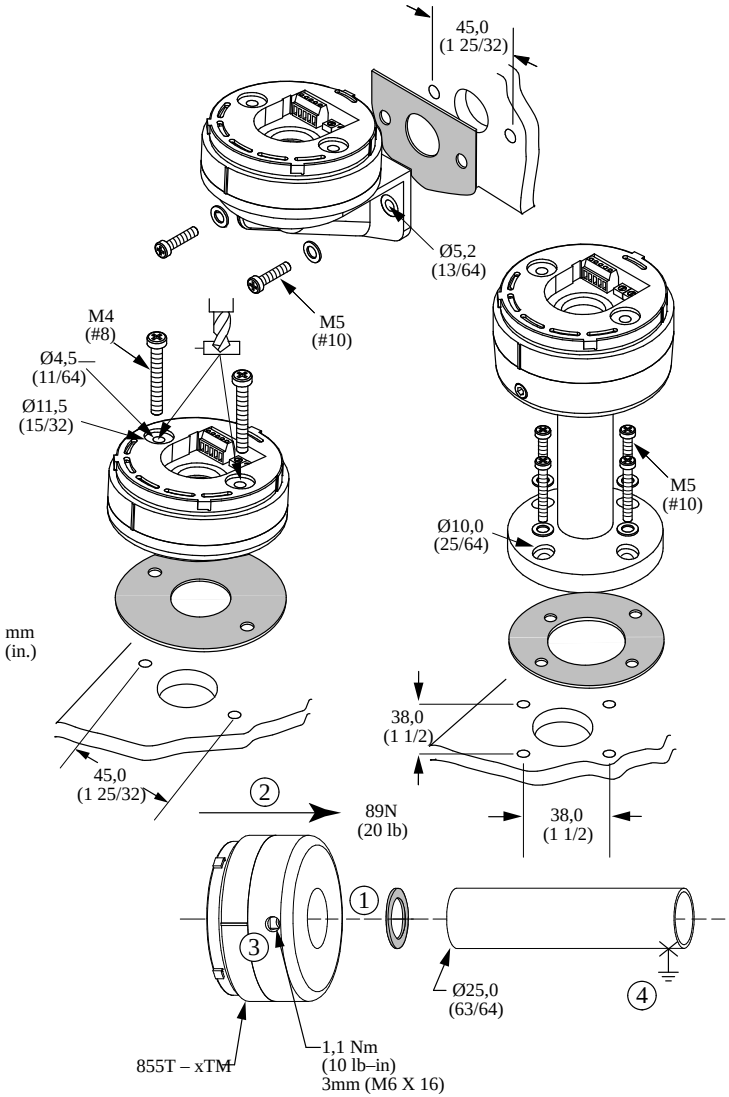
Figure 3.1 Stack Light Base Dimensions



Mounting the DeviceNet™ Stack Light

Dimensions in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

Figure 3.2 Stack Light Mounting



Chapter 4

Operations

Chapter Objectives

This chapter contains the following sections:

Section	Page
Modes of Operation	4–1
Resetting the Device	4–7
DeviceNet™ Operations	4–8

Modes of Operation

The 855T DeviceNet™ Stack Light has 3 operating modes:

- Power-up/Reset Mode
- Run Mode
- Error Mode

Power-up/Reset Mode

During a power-up or reset, the 855T DeviceNet™ Stack Light:

1. Clears outputs (turns outputs off).
2. Performs power-up diagnostic tests including:
   - Flash Checksum Test
   - Module Test
   - CAN Interface test
3. Reads and stores baud rate setting. If Autobaud is set, device synchronizes to the network.

   Important: Rotary switches are only read in power-up or reset mode.
4. Reads and stores MAC ID setting. Performs Duplicate MAC ID check.

   If a duplicate node occurs, the output turns off. You must cycle power to clear the error.

Run Mode

After a successful power-up or reset, the 855T DeviceNet™ Stack Light enters run mode and operates as a slave device to a master device.

In normal operation the device shall permit configuration of each module into any of the following operating modes. Configuration is done over the network using DeviceNet™ Manager or RSNetWorx software. The default operating mode is 5, controlled through PLC.

OPERATING MODES

Mode	Function
0	Self Test
1	For Future Use
2	For Future Use
3	Follows Module status LED
4	Follows Network status LED
5	Manual Operation, controlled by network (PLC/PC)
6	For Future Use
7	For Future Use
8	IEC Fast Rate flash: 2 Hz, 50% duty cycle
9	For Future Use
10	For Future Use
11	IEC Slow Rate flash: 0.6 Hz, 50% duty cycle
12	For Future Use
13	For Future Use
14	Horn cycle: 30 s ON / 10 s OFF
15	**WALK:** Sequence with other Mode 15 lights as: 1;2;3;4;5;1;2;...
16	**STACK:** Sequence with other Mode 16 lights as: 1;1&2;1&2&3;...;1&2&3&4&5;1
17	Binary count displayed on available Lamps
18	Odd / Even IEC Fast Rate Flash – All even number lights flash opposite all odd number lights.
19–255	Reserved

Important: Although it is allowed, it is not recommended that strobe, sound, or flashing modules be used with modes that flash.

In normal operation the device shall permit configuration of each module type. The default type is 8, Invalid Module.

MODULE TYPE

Type	Module
0	Incandescent
1	LED
2	Strobe
3	Combination Incandescent/Sound
4	Combination LED/Sound
5	Combination Strobe/Sound
6	Single Tone Sound
7	Dual Tone Sound
8	Invalid Module

Important: The module type list is abbreviated. If the module is a rotating, flashing, or steady LED, then select the LED as the module type. If the module type is a flashing incandescent, then select Incandescent as the module type .The same logic applies to combination light/sound type modules.

In normal operation the device shall permit configuration of the outputs in the case of a fault state. Default is 0, reset outputs.

FAULT STATE CONFIGURATION

Fault State Configuration	Function
0	Reset Outputs
1	Hold Last State

In normal operation the device shall permit configuration of the outputs in the case of an idle state. Default is 0, reset outputs.

IDLE STATE CONFIGURATION

Idle State Configuration	Function
0	Reset Outputs
1	Hold Last State

In normal operation the device shall permit configuration of an off-to-on delay of outputs. Default is 0, 0 ms.

OFF-TO-ON DELAY

Value	Delay Time
0	0 ms
1	2 ms
2	4 ms
3	8 ms
4	16 ms

In normal operation the device shall permit configuration of an on-to-off delay of outputs. Default is 0, 0 ms.

ON-TO-OFF DELAY

Value	Delay Time
0	0 ms
1	2 ms
2	4 ms
3	8 ms
4	16 ms

In normal operation the device shall permit disabling of the Autobaud feature. Default is 0, enabled.

AUTOBAUD

Autobaud	Function
0	Enabled
1	Disabled

Control / Status Communications

The modes defined in the previous section are set up through client/server connections at power-up. Periodic communications with the DeviceNet™ Interface will consist of a single output byte and a single status byte. The Output command is defined as follows:

OUTPUT COMMAND BYTE

Bit Number	Function When = 1	Function When = 0
7	N/A	N/A
6	N/A	N/A
5	N/A	N/A
4	Output 5 Execute	Output 5 Idle
3	Output 4 Execute	Output 4 Idle
2	Output 3 Execute	Output 3 Idle
1	Output 2 Execute	Output 2 Idle
0	Output 1 Execute	Output 1 Idle

STATUS BYTE

Bit Number	Function When = 1	Function When = 0
7	N/A	N/A
6	N/A	N/A
5	N/A	N/A
4	Position 5 Idle, Not Present, or Burned Out	Position 5 Normal
3	Position 4 Idle, Not Present, or Burned Out	Position 4 Normal
2	Position 3 Idle, Not Present, or Burned Out	Position 3 Normal
1	Position 2 Idle, Not Present, or Burned Out	Position 2 Normal
0	Position 1 Idle, Not Present, or Burned Out	Position 1 Normal

Error Mode

Errors are critical and non-critical.

Error Type	Description
Critical (non-recoverable)	Failure of diagnostic tests during power-up/reset mode Duplicate node address detected Incorrect data rate
Non-Critical (recoverable)	Pilot lamp burned out/module missing — (Power must be cycled to reset Status Byte once lamp is changed.) I/O connection timeout

See the troubleshooting chart in Chapter 5 for details on how to recover from an error.

Resetting the Device

To reset the 855T Control Tower™ Stack Light, you must cycle power to the unit or disconnect the DeviceNet™ Cabling.

DeviceNet™ Operations

The Allen-Bradley 1747-SDN and 1771-SDN DeviceNet™ Scanner Modules are master devices on the DeviceNet™ Network. The 855T Control Tower™ Stack Light supports the Master/Slave Connection Set for master/slave communications on the DeviceNet™ Network.

To communicate with 855T Control Tower™ Stack Light, the DeviceNet™ Scanner Module must be configured with the stack light:

- Node Address
- Input bytes (1)
- Output bytes (1)

The DeviceNet™ Scanner Module:

- Connects to the 855T Control Tower™ Stack Light slave device
- Performs appropriate connection configuration
- Polls the 855T Control Tower™ Stack Light for I/O

Chapter 5

Troubleshooting and Maintenance

Chapter Objectives

This chapter contains the following sections:

Section	Page
Preventive Maintenance	5–1
LED Indicators	5–2
Troubleshooting	5–3
Bulb Burnout	5–4

Preventive Maintenance

- Prevent accumulation of dust and dirt by:
  - keeping the base clean
  - keeping modules installed on base with o-rings
- Periodically check for loose connections.

ATTENTION: To avoid shock hazard, remove incoming power before checking connections.

LED Indicators

LED indicators were not provided in this design, but the LED functions can be mapped to modules. The functions are defined below:

LED Mapping	What It Means:	What To Do:
Module Status – Steady	Operating Normal	No action required
Module Status – Flashing	Standby	Device needs commissioning due to configuration missing, incomplete, or incorrect.
Network Status – Steady	Link okay, on-line, connected	No action required
Network Status – Flashing	On-line, not connected	1. Check DeviceNet™ master for correct stack light configuration information (node address, input byte, output byte) 2. Check DeviceNet™ master for proper operation.

Troubleshooting

The 855T Control Tower™ Stack Light goes through a power-up sequence when power is cycled. It first goes through an internal memory check; if it passes this stage each of the outputs is powered for 200 ms. If this does not occur, there is an internal fault with the device or the modules are not connected properly. Check the modules for a good connection and cycle power. If fault still exists, return the 855T Control Tower™ Stack Light for repair.

After power-up the device tries to connect to the network. The data rate is selected through a rotary switch; if the data rate is incorrect the device will fault. Disconnect the device, change the switch setting, and reapply power. If the data rate is unknown, Autobaud may be selected and the device will select the correct data rate. (Please note this option can only be used with a running network. It cannot be used for node commissioning.) (Autobaud will not work if it is disabled through the parameter setup.)

Once the baud rate is set, the device issues a duplicate MAC ID check. If there is a duplicate node on the network, the 855T Control Tower™ Stack Light will fault. Disconnect the device, change the node address to an available one, and reapply power.

If the stack light or network resets when multiple outputs are turned on, it is likely due to inadequate network power supply. This device has a high power consumption when used with incandescent modules. Please refer to the DeviceNet™ Planning and Installation Manual, Publication DN–6.7.2 to make sure the power supply sizing and placement is correct.

Bulb Burnout

Bulb Burnout is reflected in the Status Byte returned from the device. This feature only works with incandescent modules or incandescent/sound combination modules. The current draw of other module types is too low to sense correctly.

For burnout detection to work properly, the module type parameter must be configured by the user. This can be done with the DeviceNet™ Manager Software. If a module is misconfigured, it may be reflected as a burnout in the Status Byte.

In order to clear the Status Byte, change the bulb and cycle power. If this does not clear the fault, verify correct configuration of the module type parameter.

Specifications

Mechanical Ratings

Materials of Construction

Table A.A Materials of Construction

Part Description	Material	Relative Thermal Index	Flammability Rating
Bases, Cap	Lexan 940 (polycarbonate), black, manufacturer GE Plastics Lexan 943 (polycarbonate), gray, manufacturer GE Plastics	120°C 120°C	94V–0 94V–0
Rubber Gaskets	Perbunan NBR 70 (nitrile), manufacturer Freudenberg	110°C maximum use temperature	—
Rubber O-Ring	MF250LZ Rosso 50 Durometer Silicone, manufacturer Evsil Srl	200°C maximum use temperature	—
Pole (for pole base)	Aluminum	—	—
Plastic Washers	Polypropylene	—	—
Strain Relief Grommet	Neoprene 50 Durometer, manufacturer Kuehn Rubber Corp.	—	—
DeviceNet™ Cables	Cable jacket is yellow CPR chlorinated polyethylene, molded connector is yellow Santoprene	—	—

Shock and Vibration

MECHANICAL SHOCK

1. Wave Shape – 1/2 cycle sine wave
2. Duration – 11 milliseconds
3. Frequency – 3 times in each axis
4. Maximum Allowable G Force:

Operational	30G
Non-Operational	50G

MECHANICAL VIBRATION

1. Axis Definitions – 3 mutually perpendicular axes
2. Frequency – 5 to 2000 Hz
3. Duration – 2 hours each axis
4. Maximum Allowable G Force:

Operational	2.5G
Non-Operational	5G

Environmental Ratings

Ingress Ratings

All Bases – Type 12, IP54

Temperature Ratings

Operating Temperature	–25°C to +70°C
Storage Temperature	–40°C to +85°C

Relative Humidity (Non-Condensing)

0 to 95% Humidity

Electrical Ratings

Supply Voltage

24V DC +4%/–10% (This is due to 24V module constraints of ± 10%) The DeviceNet™ Base operates at 11 – 25V with no modules being exercised.

Power Consumption

Maximum with 5 Modules – 36 Watts

Outputs (Modules)

Up to 5 modules will be supported. The voltage and current rating is 24V DC/300mA maximum. All standard 24V module types will be supported. Please refer to 855T catalog for module specific information.

DeviceNet™ Connection Cables

Two styles of DeviceNet™ connection cables will be supported. A one meter micro-style connector and a two meter open style cable will be supported. They will consist of a 22 AWG drain wire, a 24 AWG twisted pair for communications and a 22 AWG twisted pair for power. There is a 3 ampere maximum rating on the power pair.

Flash Upgrade Frequency

Memory may be upgraded 100 times without corruption of data.

Communications

Data Rates

125 KB, 250 KB, and 500 KB

Distances

500 meters (1600 feet)	125 KB
200 meters (600 feet)	250 KB
100 meters (300 feet)	500 KB

Certifications

UL, CUL, and CE marked for all applicable directives. CE directives include EN55011, EN50081-2, EN50082-2 and EN60947-5-1. This product is intended for use in an industrial environment.

Special Notes

Please refer to the Control Tower™ Stack Lights Selection Guide (Publication 855T–1.0) or the Industrial Controls Catalog for module specific information.

DeviceNet™ Information

General Information

The 855T-Dxx (Multifunction I/O) device operates as a slave on the DeviceNet™ network. The unit supports Explicit Messages and Polled I/O Messages of the predefined master/slave connection set. It does not support the Explicit Unconnected Message Manager (UCMM).

The device supports 5 discrete outputs, one for each possible stack position.

Message Types

As a group 2 slave device, the 855T-Dxx supports the following message types.

Table B.A Supported Message Types

CAN Identifier	Group 2 Message Type
10xxxxxx111	Duplicate MAC ID Check Messages
10xxxxxx110	Unconnected Explicit Request Messages
10xxxxxx101	Master I/O Poll Command Message
10xxxxxx100	Master Explicit Request Message

xxxxxx = Node Address

Class Services

As a group 2 slave device, the 855T-Dxx supports the following class services and instance services.

Table B.B Class Services

Service Code	Service Name
14 (0x0E)	Get Attribute Single
16 (0x10)	Set Attribute Single
75 (0x4B)	Allocate Group 2 Identifier Set
76 (0x4C)	Release Group 2 Identifier Set

Object Classes

The 855T-Dxx device supports the following DeviceNet™ object classes.

Table B.C Supported Objects

Class	Object
01 (0x01)	Identity
02 (0x02)	Message Router
03 (0x03)	DeviceNet™
04 (0x04)	Assembly
05 (0x05)	Connection
08 (0x08)	Digital Input Point
09 (0x09)	Digital Output Point
15 (0x0f)	Parameter
29 (0x1d)	Discrete Input Group
30 (0x1e)	Discrete Output Group
43 (0x2b)	Acknowledge Handler
161 (0xa1)	Non-Volatile Storage

Class Code 001 (0x01): Identity Object

The Identity Object is required on all devices and provides identification of and general information about the device.

CLASS ATTRIBUTES

None

INSTANCE ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Vendor	UINT	1
2	Get	Product Type	UINT	7
3	Get	Product Code	UINT	756
4	Get	Revision Major Revision Minor Revision	STRUCT OF USINT USINT	 1 1
5	Get	Device Status	UINT	①
6	Get	Serial Number	UINT	②
7	Get	Product Name Length Name	Structure of: USINT STRING [Length]	 27 “Tower Light I/O 2-in/5-out”

① Device Status

bit 0	owned	0=not owned 1=owned (allocated)
bit 1	reserved	0
bit 2	configured	0
bit 3	reserved	0
bit 4-7	vendor specific	0
bit 8	minor cfg. fault	0=no fault 1=minor fault
bit 9	minor dev. fault	0=no fault 1=minor device fault
bit 10	major cfg. fault	0=no fault 1=major cfg. fault
bit 11	major dev. fault	0=no fault 1=major device fault
bit 12–15	reserved	0

② Unique Serial Number

COMMON SERVICES

Service Code	Class	Instance	Service Name
05 (0x05)	No	Yes	Reset
14 (0x0E)	No	Yes	Get_Attribute_Single

Class Code 002 (0x02): Message Router Object

The Message Router Object provides a messaging connection point through which a Client may address a service to any object class or instance residing in the physical device.

CLASS ATTRIBUTES

None

INSTANCE ATTRIBUTES

None

COMMON SERVICES

None

Class Code 003 (0x03): DeviceNet™ Object

The DeviceNet™ Object is used to provide the configuration and status of a physical attachment to DeviceNet™. A product must support one (and only one) DeviceNet™ Object per physical network attachment.

CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	2

INSTANCE ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get/Set	MACID	USINT	①
2	Get	Baud Rate	USINT	②
3	Get	Bus Off Interrupt	BOOL	③
4	Get/Set	Bus Off Counter	USINT	④
5	Get	Allocation Information Choice Byte Master's Node Addr	STRUCT of: BYTE USINT	⑤
100 (0x64)	Get/Set	Disable Autobaud	BOOL	⑥

① The MACID is set using two BCD rotary switches located on the module top. Valid MACID addresses are 0 to 63 (0 to 3F Hex). Setting the switch address to a value greater than 63 will disable the switch and allow software setting of the MACID. The software setting defaults to 63.

② The Baud Rate is set using a BCD rotary switch located on the module top. Valid Baud Rate settings are 0, 1, and 2; these correspond to 125 kbits/sec, 250 kbits/sec, and 500 kbits/sec respectively. Setting the switch address to a value of 3 will disable the switch and allow autobauding.

③ Bus Off Interrupt (BOI) determines the action if a Bus Off state is encountered.

BOI	Action
0	Hold chip in OFF state (default)
1	If possible reset CAN chip

④ Bus Off Counter will be forced to 0 whenever set regardless of the data value provided.

⑤ Allocation_byte

bit 0	explicit set to 1 to allocate
bit 1	polled set to 1 to allocate
bit 2	strobed (not supported)
bit 3–7	reserved (always 0)

⑥ Disable Autobaud

0	Autobauding Enabled
1	Autobauding Disabled

COMMON SERVICES

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single
75 (0x4B)	No	Yes	Allocate_Master/Slave
76 (0x4C)	No	Yes	Release_Master/Slave

Class Code 004 (0x04): Assembly Object

The Assembly Objects bind attributes of multiple objects to allow data to or from each object to be sent or received over a single connection.

CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
2	Get	Max Class ID	UINT	104 (0x68)

INSTANCE ATTRIBUTES

Assembly Object, Instance 100 Attributes

Attribute	Access	Name	Type	Value
3	Set	Data	BYTE	①
	Get	State	BYTE	②

Assembly Object, Instance 104 Attributes

Attribute	Access	Name	Type	Value
3	Get/Set	Data	STRUCT of:	
		Off_delay	UINT	③
		On_delay	UINT	④
		Autobaud	BOOL	⑤
		DOG_Fault	BOOL	⑥
		DOG_Idle	BOOL	⑦

① The Assembly Data Byte consists of 5 bits, starting at bit 0. Each bit corresponds to a station position in the stack. 1 = ON/ACTIVE.

② The Assembly Status Byte consists of 5 bits. Each of the lower 5 bits, starting at bit 0, corresponds to a station position in the stack. 1 = Failed.

③ The data for off_delay is Time in Microseconds, valid values: 0, 2000, 4000, 8000, 16000.

④ The data for on_delay is Time in Microseconds, valid values: 0, 2000, 4000, 8000, 16000.

⑤ Disable Autobaud: 0 = Enabled, 1 = Disabled.

⑥ Fault State: 0 = Reset Outputs, 1 = Hold Last State.

⑦ Idle State: 0 = Reset Outputs, 1 = Hold Last State.

COMMON SERVICES

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

Class Code 005 (0x05): Connection Object

The Connection Objects manage the characteristics of each communication connection. As a Group II Only Slave device the unit supports one explicit message connection and a POLL message connection.

CLASS ATTRIBUTES

None

INSTANCE ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	State	USINT	①
2	Get	Instance Type	USINT	1 = I/O Message
3	Get	Transport Class Trigger	USINT	
4	Get	Production Connection	UINT	②
5	Get	Consumed Connection	UINT	②
6	Get	Initial Comm. Char.	USINT	
7	Get	Production Size	UINT	
8	Get	Consumed Size	UINT	
9	Get/Set	Expected Packet Rate	UINT	default 2500 msec
12 (0x0C)	Get/Set	Timeout Action	USINT	③
13 (0x0D)	Get	Prod. Path Length	USINT	
14 (0x0E)	Get	Production Path Log. Seg., Class Class Number Log. Seg., Instance Instance Number Log. Seg., Attribute Attribute Number	STRUCT of USINT USINT USINT USINT USINT USINT	
15 (0x0F)	Get	Cons. Path Length	USINT	
16 (0x10)	Get	Production Path Log. Seg., Class Class Number Log. Seg., Instance Instance Number Log. Seg., Attribute Attribute Number	STRUCT of USINT USINT USINT USINT USINT USINT	

① Connection States:

0 = non-existent

1 = configuring

3 = established

4 = timed out

5 = deferred delete

② Connection ID's:

Connection 1 Produced Connection ID: 10xxxxxx011

Connection 1 Consumed Connection ID: 10xxxxxx100

xxxxxx = Node Address

③ Watch Dog Timeout Activity:

0 = Timeout (Explicit Messaging default)

1 = Auto Delete

2 = Auto Reset

3 = deferred delete

COMMON SERVICES

Service Code	Class	Instance	Service Name
05 (0x05)	No	Yes	Reset
14 (0x0E)	No	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

Class Code 008 (0x08): Discrete Input Point Object

The Discrete Input Point (DIP) Object models discrete inputs in a product. You can use this object in applications as simple as a toggle switch or as complex as a discrete I/O control module. There is a separate instance for each discrete input available on the device.

CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	2

INSTANCE ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Value	BOOL	①
1	Get	Status	BOOL	0

① State of the specific digital input.

COMMON SERVICES

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single

Class Code 009 (0x09): Discrete Output Point Object

The Discrete Output Point (DOP) Object models discrete outputs in a product. You can use this object in applications as simple as an actuator or as complex as a discrete I/O control module. There is a separate instance for each discrete output available on the device.

CLASS ATTRIBUTES

None

INSTANCE ATTRIBUTES

Attribute	Access	Name	Type	Value
3	Get/Set	Value	BOOL	State of Output
4	Get	Status	BOOL	①
128 (0x80)	Get/Set	Mode	BYTE	
129 (0x81)	Get/Set	Module_Type	BYTE	

① 0 = OK
1 = Burnout, Module Not Present

COMMON SERVICES

Service Code	Class	Instance	Service Name
14 (0x0E)	No	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

Class Code 015 (0x0F): Parameter Object

Use of the Parameter Object provides a known, public interface to a device's configuration data. In addition, this object also provides all the information necessary to define and describe each of a device's individual configuration parameters.

This object allows a device to fully identify a configurable parameter by supplying a full description of the parameter, including minimum and maximum values and a human-readable text string describing the parameter.

CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
2	Get	Maximum Instance	UINT	
8	Get	Parameter Class Descriptor	WORD	9 ①
9	Get	Configuration Assembly Instance	UINT	

① Parameter Class Descriptor Bit Values

	Definition
0	Supports Parameter Instances
1	Supports Full Attributes
2	Must do non-volatile storage save command
3	Params are stored in Non-Volatile storage

INSTANCE ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get/Set	Parameter_Value	(Specified in Data Type)	
2	Get	Link_Path_Size	USINT	6
3	Get	Link_Path	Array of BYTE	
4	Get	Descriptor	WORD	0 ①
5	Get	Data_Type	USINT	
6	Get	Data_Size	USINT	

① Semantics of Descriptor Instance Attribute

Bit	Definition	Meaning
0	Supports Settable Path	Indicates that link path can be set.
1	Supports Enumerated Strings	Indicates that enumerated strings are supported and can be read with Get_Enum_String service.
2	Supports Scaling	Indicates that the scaling factor should be implemented to present the value to the user in engineering units.
3	Supports Scaling Links	Indicates that the values for the scaling factor may be retrieved from other parameters.
4	Read Only Parameter	Indicates that the value attribute can only be read, and not set.
5	Monitor Parameter	Indicates that the value attribute is updated in real time by the device.
6	Supports Extended Precision Scaling	Indicates that the extended precision scaling factor should be implemented to present the value to the user in engineering units.

COMMON SERVICES

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

Class Code 029 (0x1D): Discrete Input Group Object

The Discrete Input Group (DIG) Object binds a group of discrete input points in a module. All points bound to the group share all attributes contained in the group. If an attribute is shared (points have the same attributes and the same attribute values) across more than one Discrete Input Point (DIP), then that attribute can be contained in a Discrete Input Group. A Discrete Input Point can be bound to more than one Discrete Input Group.

CLASS ATTRIBUTES

None

INSTANCE ATTRIBUTES

Attribute	Access	Name	Type	Value
3	Get	Number of Instances	USINT	2
4	Get	Binding	Array of UINT	1,2
5	Get	Status	BOOL	0 = OK 1 = Alarm
6	Get/Set	On Delay	UINT	
7	Get/Set	Off Delay	UINT	

COMMON SERVICES

Service Code	Class	Instance	Service Name
05 (0x05)	No	Yes	Reset
14 (0x0E)	No	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

Class Code 030 (0x1E): Discrete Output Group Object

The Discrete Output Group (DOG) Object binds a group of discrete output points in a module. All points bound to the group share all attributes contained in the group. If an attribute is shared across more than one Discrete Output Point (DOP), then it can be contained in a Discrete Output Group. A Discrete Output Point can also be bound to more than one Discrete Output Group.

CLASS ATTRIBUTES

None

INSTANCE ATTRIBUTES

Attribute	Access	Name	Type	Value
3	Get	Number of Instances	USINT	5
4	Get	Binding	Array of UINT	1,2,3,4,5
5	Get	Status	BOOL	0 = OK 1 = Alarm
6	Get/Set	Command	USINT	Get = 0 Set = 1 to activate group
7	Get/Set	Fault State	USINT	
8	Get	Fault Value	USINT	0
9	Get/Set	Idle State	USINT	
10 (0x0A)	Get	Idle Value	USINT	0

COMMON SERVICES

Service Code	Class	Instance	Service Name
14 (0x0E)	No	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

Class Code 043 (0x2B): Acknowledge Handler Object

The Acknowledge Handler Object is used to manage the reception of message acknowledgements. This object communicates with a message producing Application Object within a device. The Acknowledge Handler Object notifies the producing application of acknowledge reception, acknowledge timeouts, and production retry limit.

CLASS ATTRIBUTES

None

INSTANCE ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get/Set	Acknowledge Timer	UINT	
2	Get	Retry Limit	USINT	
3	Get	COS Producing Connection Instance	UINT	4

COMMON SERVICES

Service Code	Class	Instance	Service Name
14 (0x0E)	No	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

Class Code 161 (0xA1): Non-Volatile Storage Object

The NVS Object is required for flash updates to firmware.

CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	2

INSTANCE ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Status	BOOL	①
2	Get	Revision Major Revision Minor Revision	STRUCT OF USINT USINT	 0 3

① Status:

0 = Idle
1 = Transfer OK
2 = Program OK
3 = Transfer Fail
4 = Program Fail
5 = Fault

COMMON SERVICES

Service Code	Class	Instance	Service Name
01 (0x01)	Yes	Yes	Get_Attributes_All
14 (0x0E)	Yes	Yes	Get_Attributes_Single
75 (0x4B)	No	Yes	Update
76 (0x4C)	No	Yes	Transfer

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